GNR 638 (Spring 2024): Mini Project 1

Fine Grained Classification on CUB Dataset Using CNN

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March 5, 2024

1 Introduction

1.1 Background Fine-grained classification is a challenging task in computer vision, involving the categorization of objects into highly specialized classes with subtle differences.
1.2 Motivation The importance of fine-grained classification in various real-world applications and the need for efficient models to address this task.
1.3 Objectives The primary objectives of the project, including training a CNN model with an upper limit of 10 million parameters, achieving high accuracy, and ensuring parameter and training time efficiency.
1.4 Scope An overview of the report's contents, including methodology, experimental setup, results, discussion, and conclusion.

2 Methodology

2.1 Dataset Description of the CUB dataset used for training and evaluation.
2.2 Model Selection Rationale behind choosing the EfficientNet-B0 architecture for fine-grained classification and its advantages in terms of parameter efficiency and accuracy.
2.3 Transfer Learning Details of how transfer learning from ImageNet-pretrained weights was employed to initialize the model's weights and improve training efficiency.

3 Experimental Setup

3.1 Training Configuration Description of the training parameters, including batch size, learning rate, optimizer, and any regularization techniques employed.
3.2 Evaluation Metrics Explanation of the evaluation metrics used to assess the model's performance, such as accuracy, precision, recall, and F1-score.

4 Results

4.1 Training Process Visualization of the training loss and accuracy curves over epochs to demonstrate the model's convergence and performance during training.
4.2 Performance Evaluation Presentation of the final accuracy achieved on the test set and comparison with baseline models or state-of-the-art approaches.

5 Discussion

5.1 Interpretation of Results Analysis of the findings, including insights into the model's performance, strengths, limitations, and areas for improvement.
5.2 Parameter Efficiency Discussion on how the model's parameter efficiency contributed to its effectiveness in fine-grained classification tasks.
5.3 Training Time Efficiency Evaluation of the training time efficiency in terms of the number of iterations required to achieve convergence.

6 Conclusion

6.1 Summary of Findings A summary of the key findings and contributions of the project, highlighting the effectiveness of the EfficientNet-B0 model for fine-grained classification.
6.2 Implications and Future Work Discussion on the implications of the findings and suggestions for future research directions, such as exploring other efficient architectures or datasets.
6.3 Closing Remarks Final remarks on the significance of the project and its potential impact on the field of computer vision.